Project Management

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Outline

- What is Project Management?
- Scope Management
- Risk Management
- Planning and Scheduling
- Project Evaluation and Control
- Project Termination

Introduction

- Examples of projects
  - Split the atom
  - Chunnel between England and France
  - Introduce Windows XP

"Projects, rather than repetitive tasks, are now the basis for most value-added in business"

-Tom Peters

What is a Project?

Project	**Process**
• Take place outside the process world	• Ongoing, day-to-day activities
• Unique and separate from normal organization work	• Use existing systems, properties, and capabilities

A project is a unique venture with a beginning and an end, conducted by people to meet established goals within parameters of cost, schedule and quality.

Elements of Projects

- *Complex*, one-time processes

- *Limited* by budget, schedule, and resources

- Developed to resolve a *clear goal* or set of goals

- *Customer-focused*

General Project Characteristics (1/2)

- *Ad-hoc* endeavors with a clear life cycle
- *Building blocks* in the design and execution of organizational *strategies*
- Responsible for the *newest* and most improved *products*, services, and organizational *processes*
- Provide a philosophy and strategy for the *management of change*

General Project Characteristics (2/2)

- Entail *crossing* functional and organization *boundaries*
- *Traditional management functions* of planning, organizing, motivating, directing, and controlling apply
- Principal outcomes are the *satisfaction of customer* requirements within *technical*, *cost*, and *schedule constraints*
- *Terminated* upon successful completion

Why are Projects Important?

1. Shortened product *life cycles*

2. Narrow product *launch windows*

3. Increasingly *complex* and *technical* products

4. Emergence of *global markets*

5. Economic period marked by *low inflation*

Project Life Cycles

Man Hours

Conceptualization Planning Execution Termination
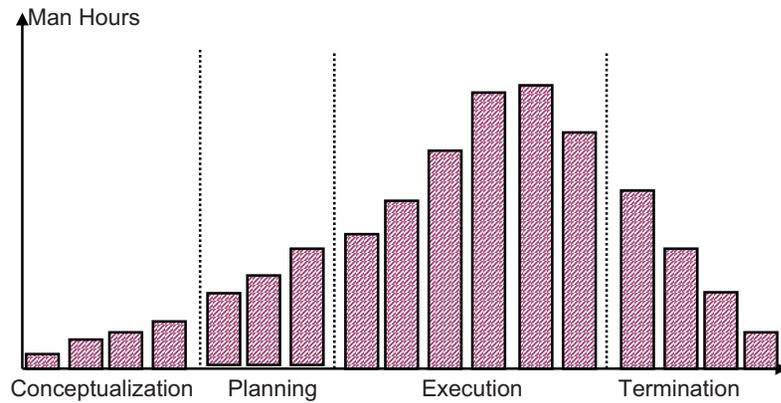
The Stages as We Experience Them

- Enthusiasm
- Disillusionment
- Panic
- Search for the Guilty
- Punishment of the Innocent
- Praise and Rewards for Nonparticipants

Determinants of Project Success

Budget

Client Acceptance

Success

Schedule

Performance
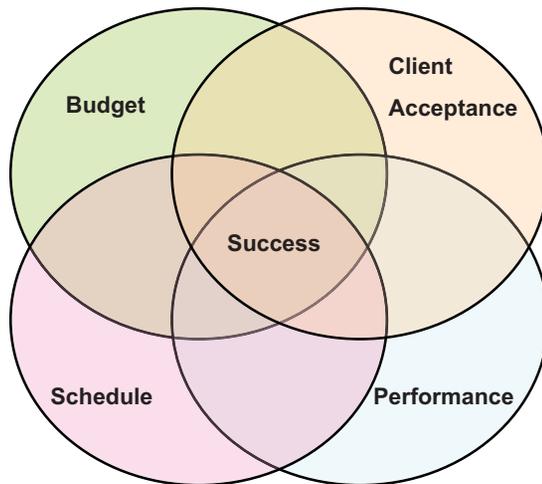
Our Goal

- Develop an *Appreciation* for Projects

- Understand *Fundamentals* of Project Management

Project Scope Management

Project Scope

Project scope is <u>everything about a project</u> – work content as well as expected outcomes.

Scope management is the function of <u>controlling a project</u> in terms of its goals and objectives and consists of:

1) Conceptual development
2) Scope statement
3) Work authorization

4) Scope reporting
5) Control systems
6) Project closeout

Conceptual Development

The **process** that addresses **project objectives** by finding the best ways to meet them.

Key steps in information development:
- Problem/need statement
- Information gathering
- Constraints
- Alternative analysis
- Project objectives

Problem Statements

Successful conceptual development requires:

- *Reduction* of overall project complexity

- *Goals and objects* are clearly stated
  - Reference points are provided

- *Complete understanding* of the problem

Statement of Work (SOW)

*A SOW is a **detailed narrative description** of the work required for a project.*

Effective SOWs contain

1. **Introduction and background**
2. **Technical description**
3. **Timeline and milestones**
4. **Client expectations**

The Scope Statement Process

1. Establish the project *goal criteria*
   a) cost
   b) schedule
   c) performance
   d) deliverables
   e) review gates
2. Develop the *management plan* for the project
3. Establish a *work breakdown structure*
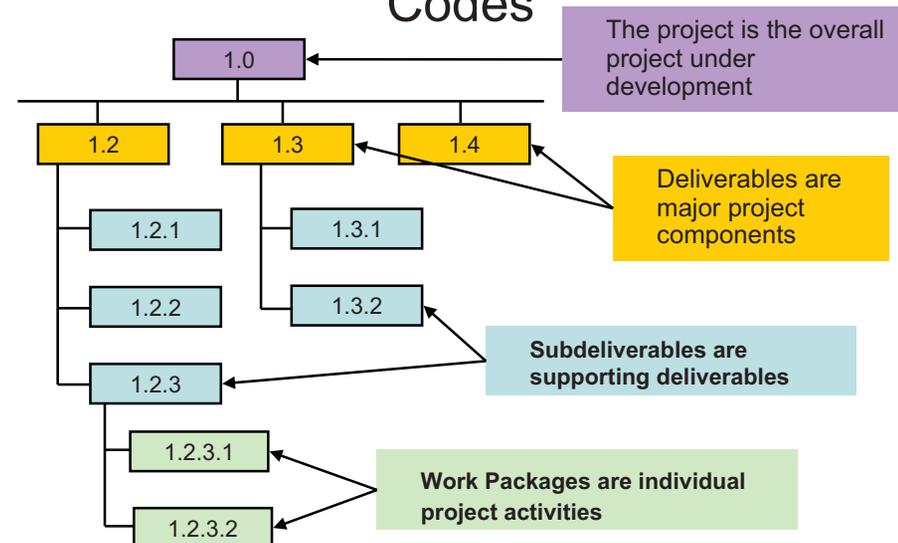4. Create a *scope baseline*

Work Breakdown Structure

A process that sets a project's scope by **breaking down** its overall **mission** into a cohesive set of synchronous, increasingly **specific tasks**.
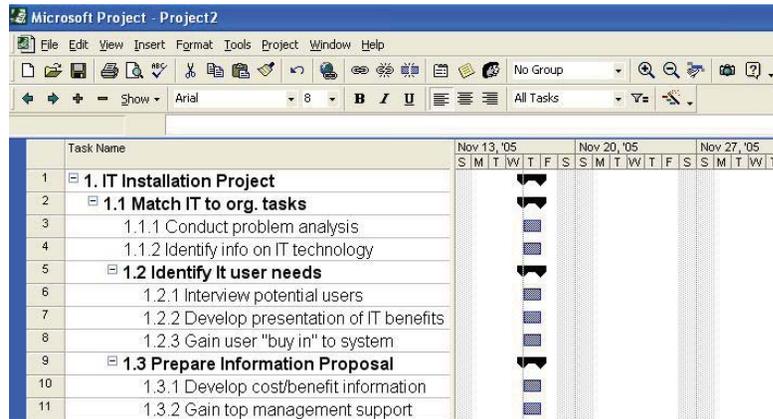
What does WBS accomplish?
- ❖ Echoes project objectives
- ❖ Offers a logical structure
- ❖ Establishes a method of control
- ❖ Communicates project status
- ❖ Improved communication
- ❖ Demonstrates control structure

Work Breakdown Structure and Codes

The project is the overall project under development

Deliverables are major project components

Subdeliverables are supporting deliverables

Work Packages are individual project activities

Sample WBS in MS Project

Work Packages

Lowest level in WBS

Deliverable result

One owner

Miniature projects

Milestones

Fits organization

Trackable

Responsibility Assignment Matrix

Deliverable	Task & Code		LEAD PROJECT PERSONNEL				
			Dave IS	Sue HR	Ann R&D	Jim R&D	Bob IS
Match IT to Org. Tasks 1.1	Problem Analysis	1.1.1	■			☆	○
	Develop info	1.1.2	○	■			☆
Identify IS user needs 1.2	Interview users	1.2.1	○	○	☆		□
	Develop show	1.2.2	☆			■	○
	Gain user "buy in"	1.2.3		☆	■	○	
Prepare proposal 1.3	Find cost/ benefit info	1.3.1			○		□

■ Notification   ○ Responsible   □ Approval   ☆ Support

Work Authorization

The formal **"go ahead"** to begin work

Follows the scope management steps of:

1. scope definition
2. planning documents
3. management plans
4. contractual documents

Contractual Documentation

Most contracts contain:
- **Requirements**
- **Valid consideration**
- **Contracted terms**

Contracts range from:

Lump Sum ← ← ← ← ← → → → → → Cost Plus
also called
"Turnkey"

Scope Reporting

*determines **what** types of information reported, **who** receives copies, **when**, and **how** information is acquired and disseminated.*

Typical project reports contain
1. Cost status
2. Schedule status
3. Technical performance

Types of Control Systems

o Configuration or change

o Design

o Trend monitoring

o Document

o Acquisition

o Specification

Project Closeout

The job is not over until the paperwork is done…

Closeout documentation is **used to**:
- Resolve disputes
- Train project managers
- Facilitate auditing

Closeout documentation **includes**:
- Historical records
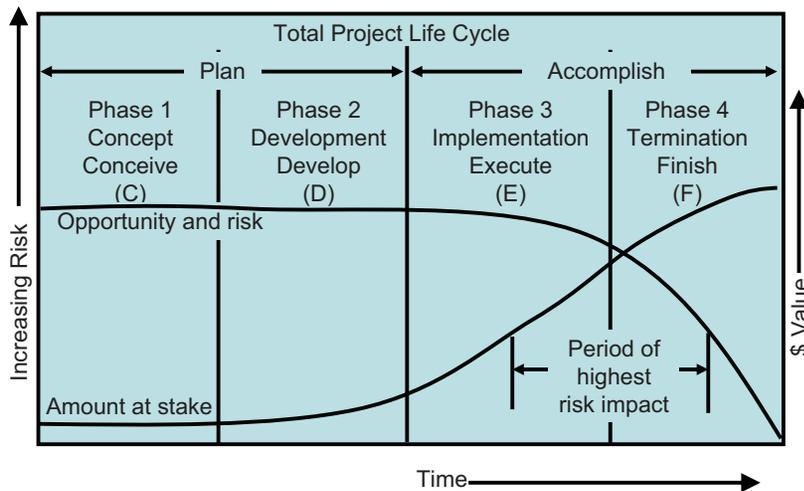- Post project analysis
- Financial closeout

Project Risk Management

Risk

*Risk management - the **art** and **science** of **identifying, analyzing, and responding** to risk factors throughout the **life of a project** and in the best interest of its objectives.*

Project risk – any possible event that can negatively affect the viability of a project

Risk Vs Amount at Stake

Process of Risk Management

- What is likely to happen?

- What can be done?

- What are the warning signs?

- What are the likely outcomes?

Project Risk = (Probability of Event)(Consequences of Event)

Four Stages of Risk Management

❖ Risk *identification*

❖ *Analysis* of probability and consequences

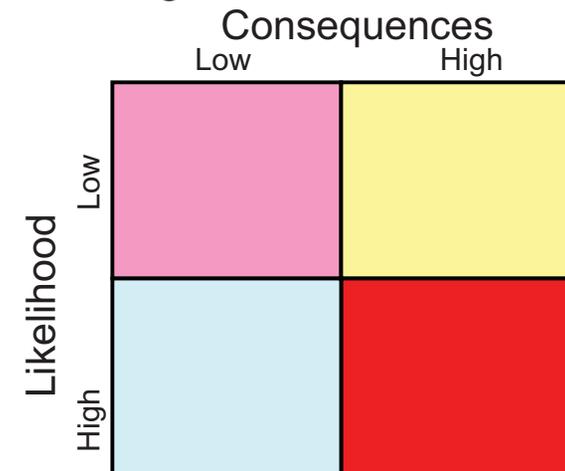❖ Risk *mitigation* strategies

❖ *Control* and documentation

Risk Clusters

- Financial
- Technical
- Contractual/Legal

- Commercial
- Execution

- Common Types
  - Absenteeism
  - Resignation
  - Staff pulled away
  - Time overruns
  - Skills unavailable
  - Ineffective Training
  - Specs incomplete
  - Change orders

Risk Factor Identification

➢ Brainstorming meetings

➢ Expert opinion

➢ Past history

➢ Multiple (team based) assessments

Risk Management Assessment Matrix

Consequences

	Low	High
Low (Likelihood)		
High (Likelihood)		

Risk Mitigation Strategies

- Accept
- Minimize
- Share
- Transfer
- Contingency Reserves

Control & Documentation

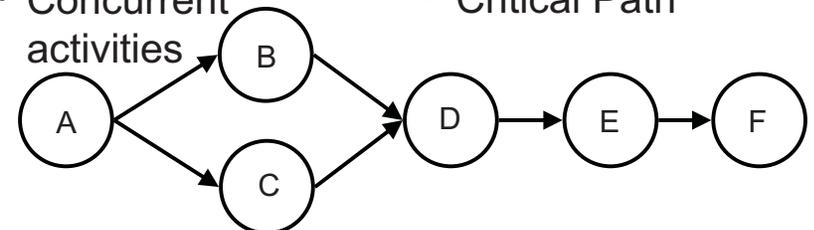**Help managers classify and codify risks, responses, and outcomes**

Change management report system answers
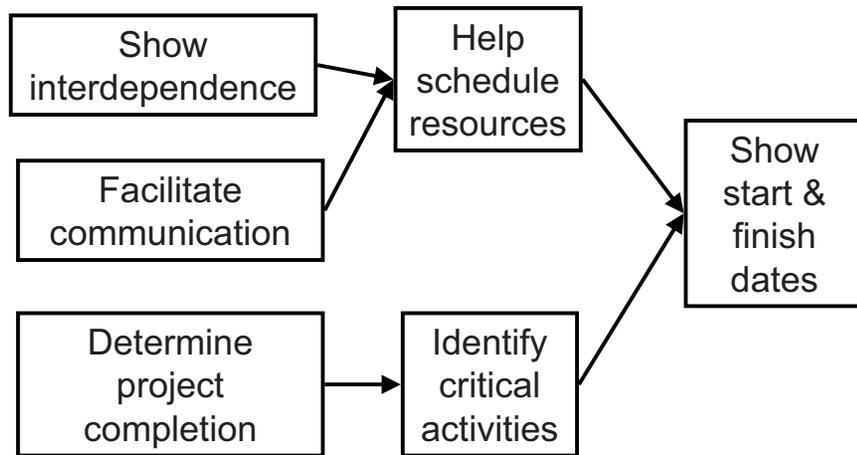- What?
- Who?
- When?
- Why?
- How?

Planning and Scheduling
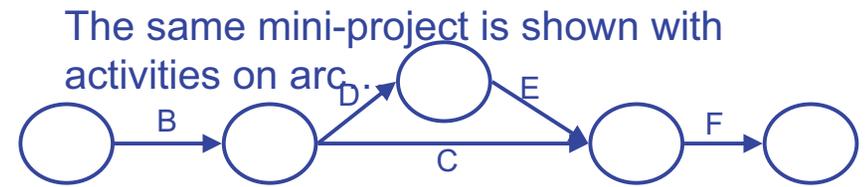
Project Scheduling Terms

- Successors
- Predecessors
- Network diagram
- Serial activities
- Concurrent activities
- Merge activities
- Burst activities
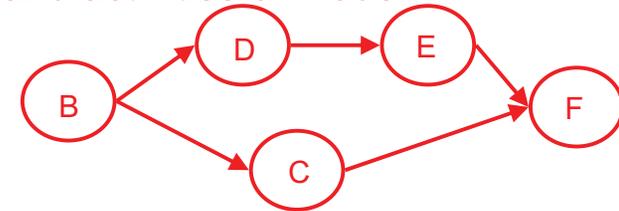- Node
- Path
- Critical Path

Network Diagrams

```
┌──────────────┐      ┌──────────────┐
│     Show     │─────▶│     Help     │
│interdependence│     │   schedule   │
└──────────────┘      │  resources   │      ┌──────────┐
                      └──────────────┘      │   Show   │
┌──────────────┐            │               │ start &  │
│  Facilitate  │────────────┘      ────────▶│  finish  │
│communication │                            │  dates   │
└──────────────┘                            └──────────┘
                                                 ▲
┌──────────────┐      ┌──────────────┐           │
│  Determine   │      │   Identify   │───────────┘
│   project    │─────▶│   critical   │
│ completion   │      │  activities  │
└──────────────┘      └──────────────┘
```

AOA Vs. AON

The same mini-project is shown with activities on arc…

…and activities on node.

Node Labels

Early Start	ID Number	Early Finish
Activity Float	Activity Descriptor	
Late Start	Activity Duration	Late Finish

Duration Estimation Methods

- Past experience
- Expert opinion
- Mathematical derivation – Beta distribution
  - Most likely (m)
  - Most pessimistic (b)
  - Most optimistic (a)

$$Activity\ Duration = TE = \frac{a + 4m + b}{6}$$

1. Sketch the network described in the table.
2. Determine the expected duration and variance of each activity.

Task	Predecessor	a	b	c
Z	--	7	8	15
Y	Z	13	16	19
X	Z	14	18	22
W	Y, X	12	14	16
V	W	1	4	13
T	W	6	10	14
S	T, V	11	14	19

Constructing the Critical Path

- Forward pass – an *additive move* through the network from *start to finish*

- Backward pass – a *subtractive move* through the network from *finish to start*

- Critical path – the *longest path* from end to end which determines the *shortest project length*

Rules for Forward/Backward Pass

Forward Pass Rules (ES & EF)
- – ES + Duration = EF
- – EF of predecessor = ES of successor
- – Largest preceding EF at a merge point becomes ES for successor

Backward Pass Rules (LS & LF)
- – LF – Duration = LS
- – LS of successor = LF of predecessor
- – Smallest succeeding LS at a burst point becomes LF for predecessor

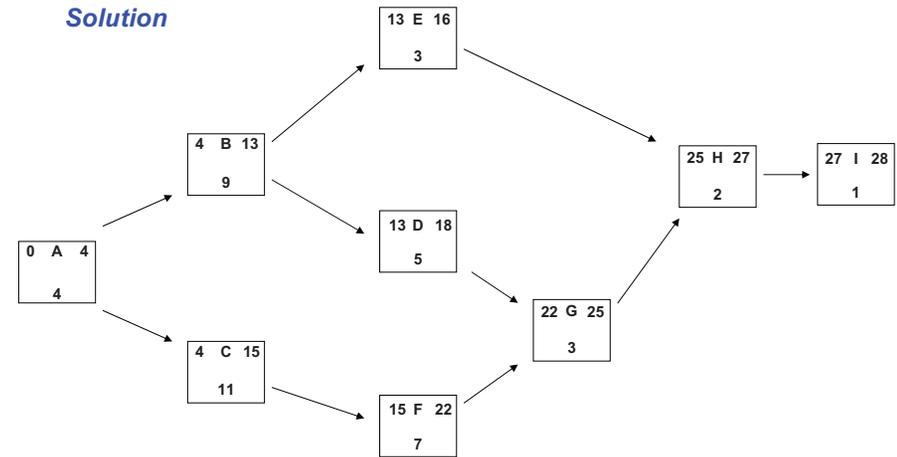| Task	Predecessor	Time
A	--	4
B	A	9
C	A	11
D	B	5
E	B	3
F	C	7
G	D, F	3
H	E, G	2
K	H	1

1. Sketch the network described in the table.

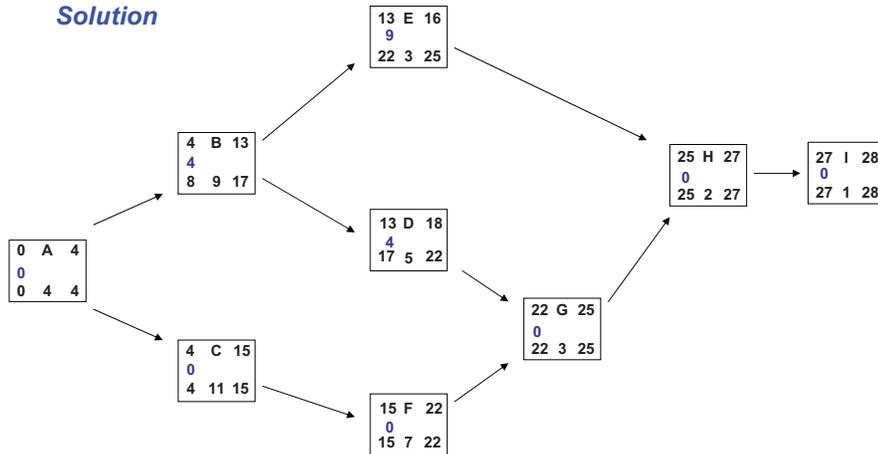2. Determine the ES, LS, EF, LF, and slack of each activity
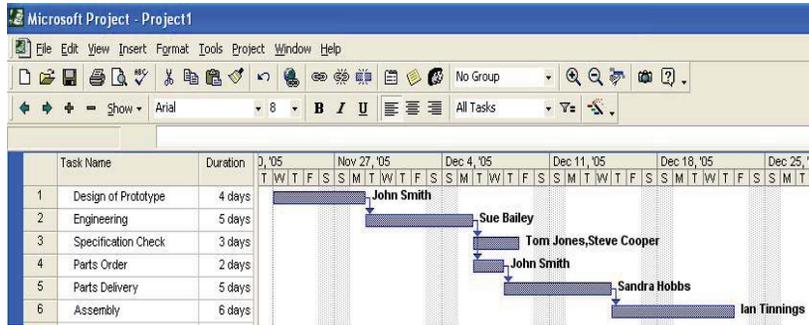
Solution
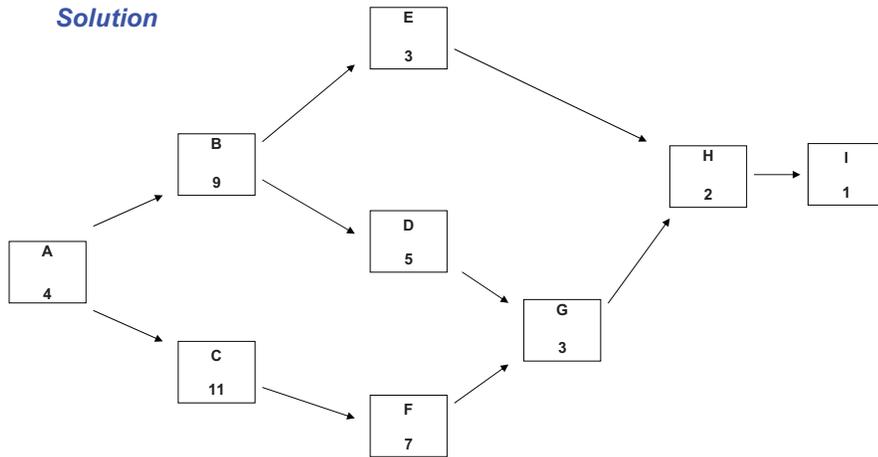
Solution

Solution

Gantt Charts

✓ Establish a time-phased network
✓ Can be used as a tracking tool
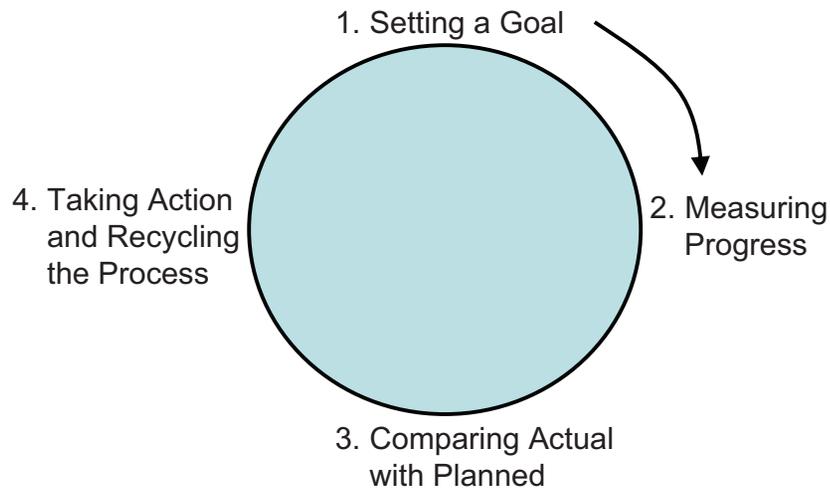
Benefits of Gantt charts

1. **Easy** to create and comprehend
2. Identify the schedule **baseline** network
3. Allow for **updating** and **control**
4. Identify **resource needs**
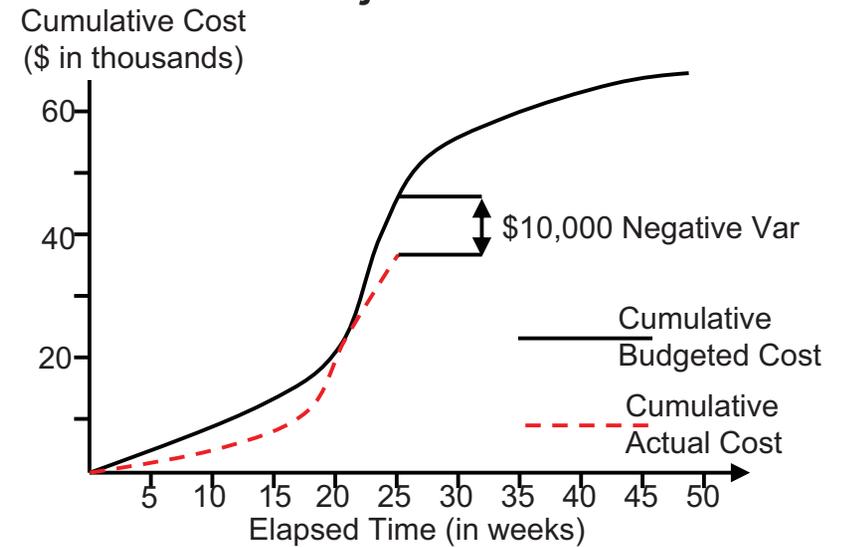
Gantt Chart With Resources in MS Project

Evaluation and Control

The Project Control Cycle

1. Setting a Goal

2. Measuring Progress

3. Comparing Actual with Planned

4. Taking Action and Recycling the Process

The Project S-Curve

Cumulative Cost ($ in thousands)

$10,000 Negative Var

Cumulative Budgeted Cost

Cumulative Actual Cost

Elapsed Time (in weeks)

Milestone Analysis

Milestones are *events or stages* of the project that represent a *significant accomplishment.*

Milestones
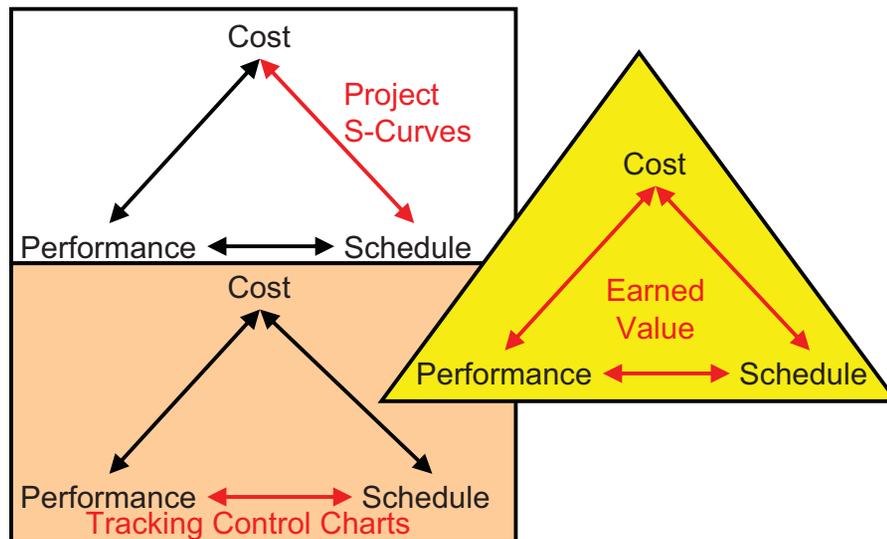…**signal** the team and suppliers
…can **motivate** the team
…offer **reevaluation** points
…help **coordinate** schedules
…**identify** key review gates
…**delineate** work packages

Tracking Gantt Chart
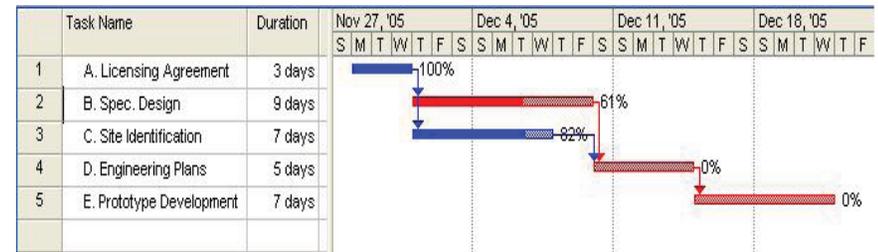
Project status is updated by linking task completion to the schedule baseline

Earned Value Management

Cost

Project S-Curves

Performance — Schedule

Cost

Performance — Schedule

Tracking Control Charts

Cost

Earned Value

Performance — Schedule

Earned Value Terms

❖ Planned value

❖ Earned value

❖ Actual cost of work performed

❖ Schedule performance index

❖ Cost performance index

❖ Budgeted cost at completion

Steps in Earned Value Management

1. *Clearly define each activity* including its resource needs and budget

2. *Create usage schedules* for activities and resources

3. *Develop a time-phased budget* (PV)

4. *Total the actual costs* of doing each task (AC)

5. *Calculate* both the budget variance (CV) and schedule variance (SV)

Earned Value Milestones
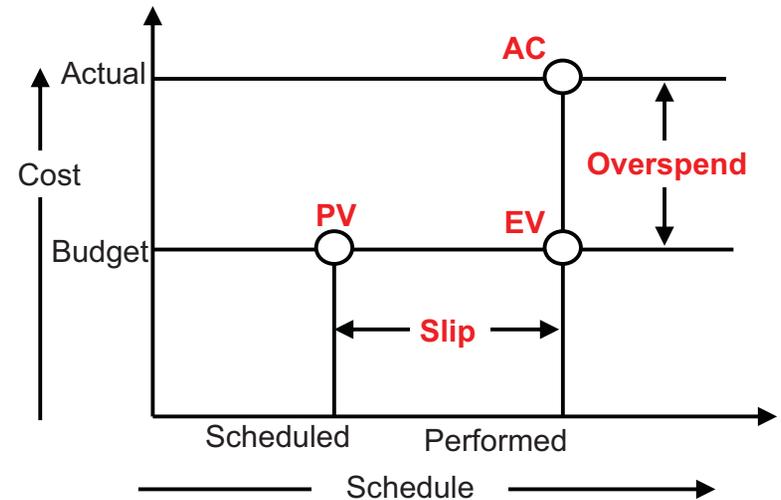
Earned Value Example

Activity	Jan	Feb	Mar	April	Plan	%C	Value
Staffing	8	7			15	100	15
Blueprint			4	6	10	80	8
Prototype			2	8	10	60	6
Design				3	3	33	1
Mon Plan	8	7	6	17	38	∑	30
Cmltv	8	15	21	38			
Mon Act	8	11	8	13			
Cmltv Act	8	19	27	40			

Value
8=80%(10)

Earned Value
30=15+8+6+1

Planned Value
38=15+10+10+3

Cumulative
40=8+11+8+13

Earned Value Example

Schedule Variances
Planned Value (PV) = 38 = 15+10+10+3
Earned Value (EV) = 30 = 15+8+6+1
Schedule Performance Index = .79 = 30/38 = EV/PV
Estimated Time to Completion = (1/.79)x4=5

Cost Variances
Actual Cost of Work Performed (AC) = 40 = 8+11+8+13
Cost Performance Index = .75 = 30/40 = EV/AC
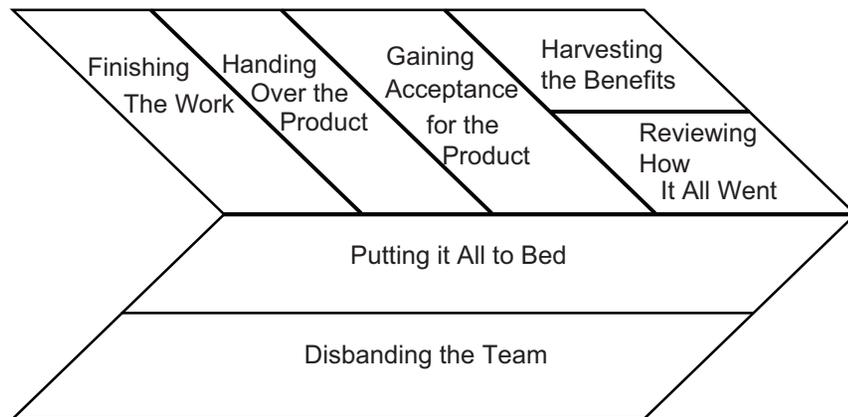Estimated Cost to Completion = 50.7 = (1/.75)x38

Completion Values in EVM

Accurate and *up-to-date* information is *critical* in the use of *EVM*

➢ 0/100 Rule

➢ 50/50 Rule

➢ Percentage Complete Rule

Project Termination

Elements of Project Closeout Management

Finishing The Work — Handing Over the Product — Gaining Acceptance for the Product — Harvesting the Benefits — Reviewing How It All Went — Putting it All to Bed — Disbanding the Team

Lessons Learned Meetings

Meeting Guidelines
✓ Establish clear rules of **behavior**
✓ Describe **objectively** what occurred
✓ Fix the **problem**, not the blame

Common Errors
➢ Misidentifying **systematic errors**
➢ **Misinterpreting lessons** based on events
➢ Failure to **pass along** conclusions

Closeout Paperwork

- Documentation

- Legal

- Cost

- Personnel

Why are Closeouts Difficult?

- ✓ <u>Project sign off</u> can be a de-motivator

- ✓ <u>Constraints</u> cause shortcuts on back-end

- ✓ <u>Low priority</u> activities

- ✓ Lessons learned analysis seen as <u>bookkeeping</u>

- ✓ <u>Unique</u> view of projects

Early Termination Decision Rules

- Costs exceed business benefits

- Failure to meet strategic fit criteria

- Deadlines are continually missed

- Technology evolves beyond the project's scope

Project Termination Issues — Emotional (Staff, Client); Intellectual (Internal, External)
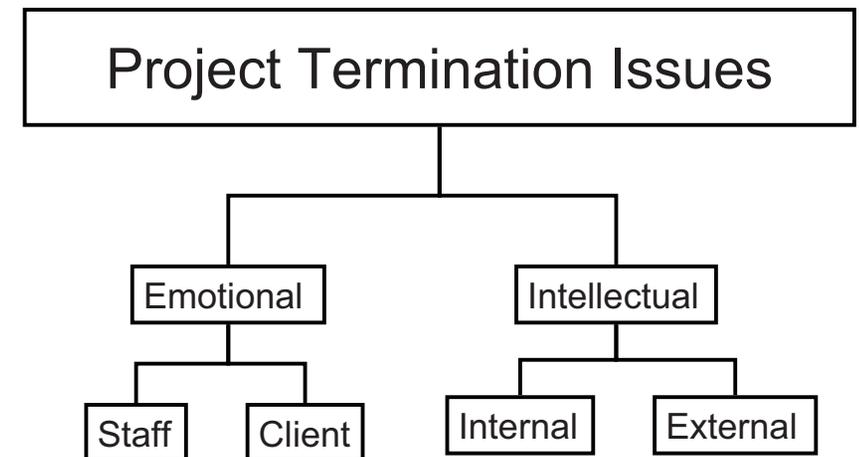
Claims & Disputes

Two types of claims
- Ex-gratia claims
- Default by the project company

Resolved by
- Arbitration
  - Binding
  - Non-binding
- Standard litigation

Protecting Against Claims

o Consider claims as part of the *project plan*

o *Verify stakeholders* know their risks

o Keep *good records* throughout the life cycle

o Keep *clear details* of change orders

o *Archive all correspondence*

Final Report Elements

❑*Project performance*

❑*Administrative performance*

❑*Organizational structure*

❑*Team performance*

❑*Project management techniques*

❑*Benefits to the organization and customer*